drive.web smarty

dw113 - Installation & Operation Manual

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Warning!

It is essential that you read and understand this entire manual, the entire Optidrive Plus 3GV User Guide and the entire contents of the *savvy* software "Help" menu before proceeding with your installation and product configuration. For more information and to download product manuals and software, go to ***www.driveweb.com***.

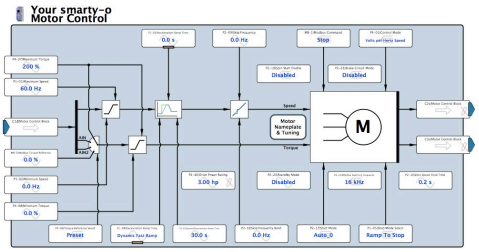
Warning!

Your use of *savvy* software, *drive.web* devices and Optidrives may cause motors and machinery to power up with high voltages or start or operate in an unexpected, dangerous or lethal way. It is essential that you are completely familiar with *savvy* and all of the equipment and the system design you are working with before attempting to program or edit a program or connect to any live device.

Warning!

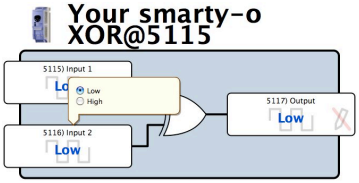
You are entirely responsible for the configuration or use of any *drive.web* product. By configuring or using these products you agree to indemnify and hold harmless Bardac Corporation, its' employees, directors, officers, distributors and resellers against the consequences of your configuration or use of the products.

dw113 smarty-o Introduction



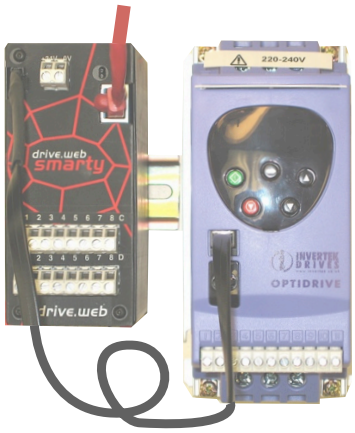
Take control of your ODP, Optidrive Plus, expand your interface and add computation power with this rugged, versatile, and easy to use process and drives management system. Create large integrated systems where processing bandwidths are not affected by system size.

smarty-o Features



- ***drive.web*** Distributed Process Control over **Ethernet**
- **Modbus TCP/IP over Ethernet** with option 04.
- **Internet accessible** configuration, monitoring & control.
- **"Drag 'n drop,"** easy connections with graphical documentation.
- Automated, on-line upgrades with *savvy* software.
- **System libraries** Basic, Process Control, Winders, Math & Encoders.
- **Function Blocks**; Extensive ODP parameter control and monitoring. Arithmetic, logic, PID, comparator, filter, latch, timer, counter, ramps, winder diameter, taper tension, torque compensator, more.
- **I/O options;** Universal In, Analog Out, Digital I/O, Two Encoders, Serial and Ethernet.

smarty-o Available Options



smarty-o models include **drive.web** over Ethernet distributed process control, comprehensive ODP interface, **Basic Control** Function Block Library with arithmetic, logic, PI, clamps, data switches and more. Please see Appendix A for a complete listing of function blocks by library and option. Includes **18" standard link cable, LA502168U018.**

02 Modbus RTU slave. 250V isolated EIA485(RS485), up to 19.2 kbps.

03 I/O Package - UIP's (7), AOP's (2), DIO's(3), **10V Ref.** 10mA max.

Seven Universal Inputs multi-range analog, digital, differential

Two Analog Outputs 0 to 10V, 10mA max. 10 bit resolution

Three configurable Digital Inputs or Outputs. 24V, 50mA output.

04 ModbusTCP/IP. Ethernet, 10baseT enabled Modbus slave/server.

05 Process Control. Function Block Library 1 - Math, Logic, PID, Switches, Comparators, User data log, Profiler, Presets, Latch, Filters, Counters, Timers and more, see Appendix A.

06 Winder Control Function Block Library 2 - Diameter Calculator, Taper Tension, Torque Compensator.

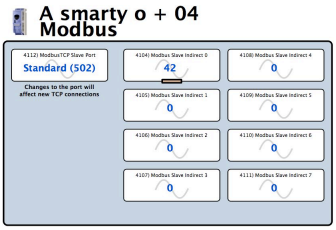
07 and 08 Encoder 1 and 2 Inputs. Bi-directional with marker, EIA 422/485, 24V, 300kHz With encoder logic, position, speed functions.

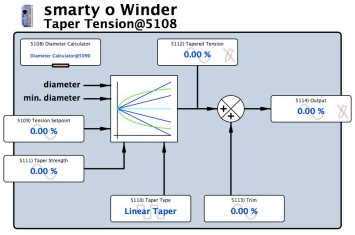
09 Real time clock-battery backup, calendar, and event time-stamp.

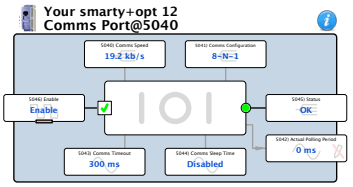
10 Advanced Math Function Block Library 3 - Trig, Polynomials, Log, Exponent, more, see Appendix A.

11 Encoder Control Function Block Library 4 - Speed Lock, Registration, Position (Requires Option 07 and 08)

12 Modbus RTU Master. 250V isolated EIA485/RS485 serial up to 115kbps







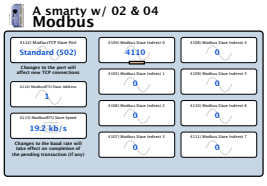
smarty-o Options Important Notes:

Options 04, 05, 06, 10 and 11 are software options, easily field installed

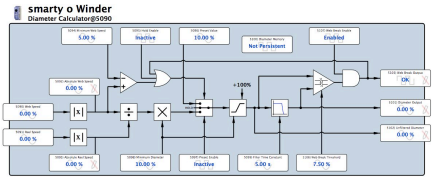
Options 02 and 12 are mutually exclusive.

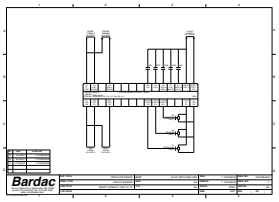
Option 02 & 12 not available with 2 encoder inputs, option 08. Option 08 includes **18" isolated serial link cable, LA502402.**

Modbus Options 02, 04 and 12 enable communication with a wide range of industrial devices from drives to operator stations, PLCs and SCADA systems. It is essential that you read and understand the entire **drive.web** Modbus Installation and Operation Manual, HG502421, included with these options before using them.



smarty-o Winder Specials





Include options **05** and **06**, pre-installed generic winder **system configuration** and a wiring diagram drawing for fast commissioning of a wide range of winder applications.

1101 ***smarty winder 1*** Open Loop Constant Tension Center Winder.

1102 ***smarty winder 2*** Closed Loop Dancer Control Center Winder.

1103 ***smarty winder 3*** Closed Loop Loadcell Control Center Winder.

smarty-o Physical Installation

Mount on DIN rail in an electrical enclosure that provides the required environmental protection. You can mount with zero clearance on the side of the drive but provide at least 5" space if mounting directly above or below the drive.

smarty-o **Dimensions and Weight:** 2.3"w, 4.5"h, 4.7"d (59, 115, 120mm) 1.0 lb (0.45 Kg)

smarty-o **Power Requirements:** Regulated 24VDC ±15%, 50mA plus loads. ***smarty*** is fitted with a 1A auto reset fuse

smarty-o **Storage and Operation Environment:** Temperature range; 0 to 50C. Humidity less than 95% non-condensing.

smarty-o **Ethernet Port** Standard RJ45 8P8C, 10BaseT, Link and Activity LED's

Set up Your *Optidrive Plus*, WARNING!

You must read and understand the entire Optidrive Plus User Guide before proceeding! Dangerous, high voltages will exist that may cause **injury or death!** Only qualified personnel should proceed!

- Check your **model number** and **firmware revision**. Model number must end in -M, and parameters P0-28 and P0-29 should indicate 2.2 or higher.
- Check the **baud rate** and **drive communication address** are at default settings. P2-26 must be 115.2 kbps and P2-27 must be 1.
- If your ODP is part of an *Optibus* network, use the Data Cable Splitter, OD485SP-IS to allow communication with your ***smarty-o***. Your ***smarty-o*** will only communicate with the system master.

smarty-o Ethernet Networking & Programming

It is important to have a basic understanding of Ethernet TCP/IP networks. ***smarty-o*** uses the same IP address format as computers and may disrupt a local network or function improperly if it is not set up with a **unique IP address**. ***smarty-o***s are all shipped with the IP address, **10.189.189.189**. Consult your company's IT department for an appropriate, unique address.

Set up Your Physical Ethernet Network - You Will Need:

- A standard Category 5e cable (with 8P8C/RJ-45 connectors on both ends) for each ***drive.web*** device and your computer.
- An Ethernet switch with sufficient ports to support all your ***drive.web*** devices and your computer.

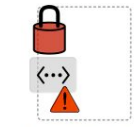
Set up Your Computer - Get *savvy*

- The free ***drive.web savvy*** software allows you to easily program and monitor your ***smarty-o*** and create distributed control systems.

- You can find useful networking information in the Basic Network Administration Section in the ***savvy*** user manual under the, "Help," menu.
- To download the latest version of ***savvy*** and to view the ***savvy*** user manual, go to ***www.driveweb.com*** and click on, "get savvy."
- Windows users will need to have **Java Runtime Environment** installed to run ***savvy***. There is a link on this page to download Java for free.

Get started with *savvy*

- Before proceeding with your systems designs it is very important to familiarize yourself with ***savvy***, the configuration software.
- We strongly recommend that you read the introductory guides, "Getting Started with ***savvy***," "Getting Started with ***savvy-SFD***," and , "***savvy-SFD*** and the PL series drive." Find these guides under the Help menu.
- Use the unique, " Create Phantom," feature to practice your design and configuration techniques. Design a system in any Phantom ***drive.web*** device and export it for use in your devices.
- We also strongly recommend that you attend one of our regular on-line training seminars. Contact us at **training@driveweb.com** or **call 410-604-3400** to register.
- Under the Directory menu, click on, "Discover All Local Devices." If your ***smarty-o*** is powered up and physically connected to the same local network as your computer, an icon should appear on the screen.
- If the red padlock icon shown above appears, your computer's subnet mask is preventing proper communication with the ***smarty***. Under the File menu, click on, "Administrate - Set IP Addresses for System." A list will appear with a serial number that should match the serial number label on your ***smarty***.
- Enter an IP address within your computer's subnet mask. An ODP icon should appear. The icon with question mark indicates no communication has been made. The clear icons show the ODP frame size that is connected. The double arrow and yellow triangle instantly warns you if serial communication with the drive is interrupted.
- **Important Note:** If serial communication with your *Optidrive Plus* is interrupted for more than 2 seconds while enabled, the drive will trip and display, "**SC-trp**." The motor will coast to a stop. Communications loss may be caused by a broken connection in the serial link or a power loss at the ***smarty***.
- Right click on the icon and choose, "Change Name," to name your ***smarty.***
- Left click to view the first level, device overview screen. You can access the drive control and monitoring parameters, the Function Block Engine and if you have option 02, 04, or 12, a Modbus icon. Left click to view the next level.
- Left click on function blocks to view and adjust parameters.
- Left click on parameters to open the setter box unless they show a crossed-out pen meaning that they are read-only. You can adjust the parameter value with mouse or keys.
- Right click on parameters to get info, add to a dock, copy, start or end connections, rename, and rescale.
- ***drive.web*** works with 16 bit words allowing raw decimal integer values **0 to 65535 or ±32767.** These raw values are limited and/or scaled depending



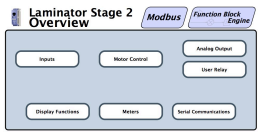
10.189.189.189

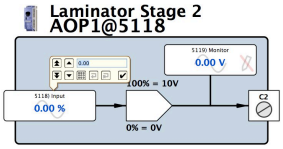
192.168.1.25

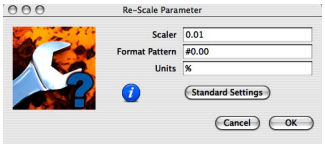
192.168.1.25

192.168.1.25

Laminator Stage 2

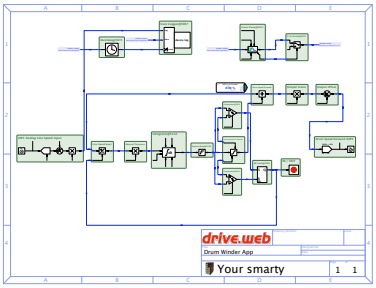






on the parameter. This prevents illegal values and presents numbers in the most useful formats. Right click to adjust scaling to fit your needs. Check scaling when making connections.

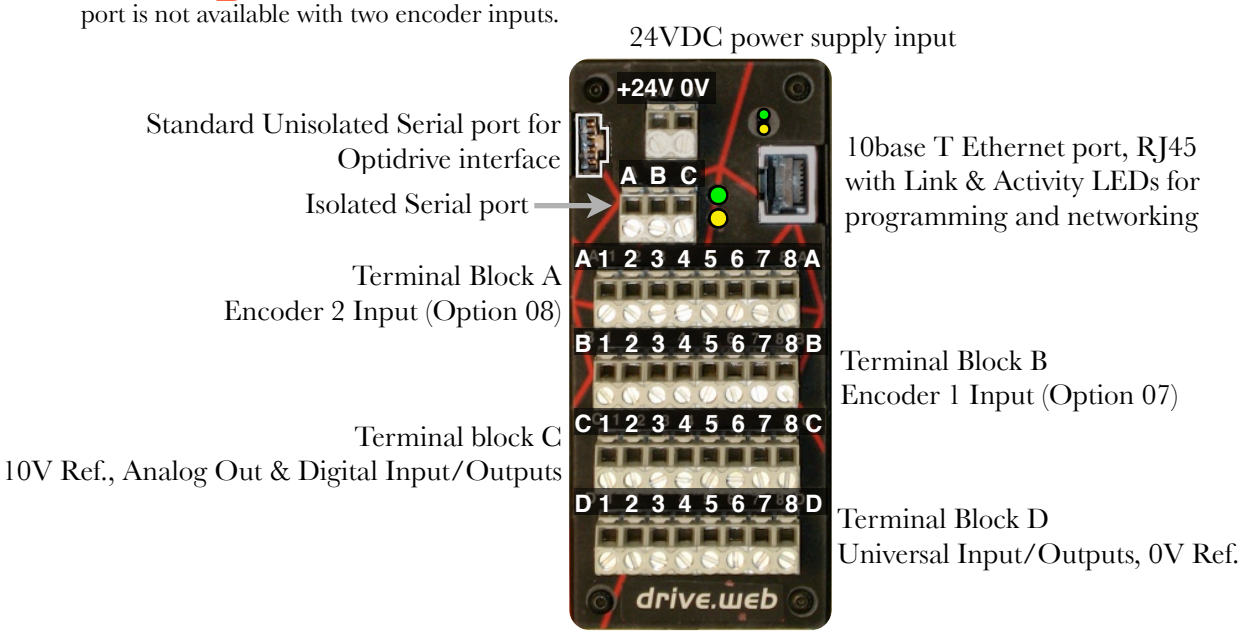
Upgrade *savvy* with Signal Flow Diagram Option - SFD



- With ***savvy-SFD***, implement your systems in a graphical manner and create professional quality engineering drawings that are stored in your ***smarty***.
- Set borders, "**Drag n' Drop**," connections, zoom, pan and see your system clearly. Multi-page drawings with cross-referencing are easy to create.
- Get the ***savvy-SFD*** upgrade on-line under the Commerce menu. Select, "Upgrade ***savvy***," and process a Voucher, coupon or credit card.
- Find a guide to this upgrade, "Getting Started with ***savvy-SFD***," under the help menu.

smarty-o Terminals

Note: The build in this picture is not possible. The standard serial port is not available with two encoder inputs.


24VDC power supply input
+24V 0V
Standard Unisolated Serial port for Optidrive interface
A B C
Isolated Serial port
10base T Ethernet port, RJ45 with Link & Activity LEDs for programming and networking
A 1 2 3 4 5 6 7 8 A
Terminal Block A
Encoder 2 Input (Option 08)
B 1 2 3 4 5 6 7 8 B
Terminal Block B
Encoder 1 Input (Option 07)
C 1 2 3 4 5 6 7 8 C
Terminal block C
10V Ref., Analog Out & Digital Input/Outputs
D 1 2 3 4 5 6 7 8 D
Terminal Block D
Universal Input/Outputs, 0V Ref.
drive.web

smarty-o Option 03 AOP, DIO & UIP

Terminal	Function
C1	+10V Ref.
C2	AOUT1
C3	AOUT2
C4	0V
C5	DIO1
C6	DIO2
C7	DIO3
C8	0V

Terminal	Function
D1	UIP1
D2	UIP2
D3	UIP3
D4	UIP4
D5	UIP5
D6	UIP6
D7	UIP7
D8	0V

Terminal Block C ~ 10V, Analog Outputs and Digital I/O

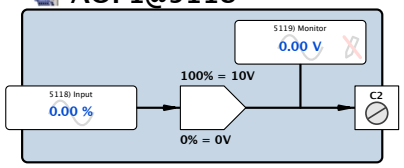
C1, 10V Reference. Supplies 10mA max current.

C2, C3, Two Analog Outputs. 0V to 10V, 10mA source,10 bit res. Input parameter 0% to 100% translates to 0V to 10V output.

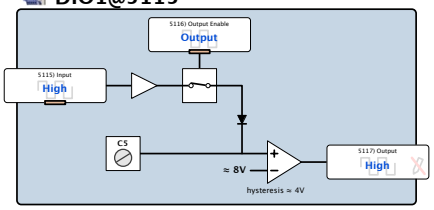
C5, C6, C7, Three Digital I/O Terminals. Click on the, "Output Enable," parameter to change from input to output or connect to dynamically configure. Connect, 0 = Input and 1 = Output.

- **Output Configuration; 24V with 50mA** max. source current is output to the terminal when the function block's input parameter is set to, "High" or ≥ 1
- **Input Configuration**: Input parameter is ignored and output parameter follows 24V logic at the terminal. High = 1 and Low = 0. Threshold is ~8V with 4V hysteresis. 12V logic may NOT function properly.

smarty + option 03
AOP1@5118



smarty + option 03
DIO1@5115

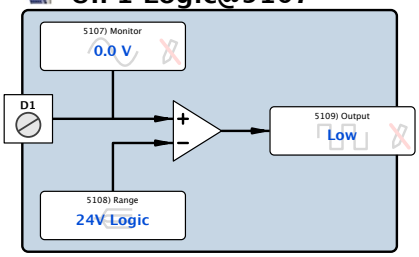


Terminal Block D ~ Universal Analog/Logic Inputs

D1 - D7, Seven UIP's 100KΩ input impedance, 12-bit resolution.

- You may monitor a terminal as an analog, logic, or differential input in separate function blocks.
- You may dynamically configure logic and analog ranges by connecting to the Range parameter.
- Set the Differential Block Range to the maximum expected voltage difference between the two input terminals. The output is the percentage difference between the terminals over this range.

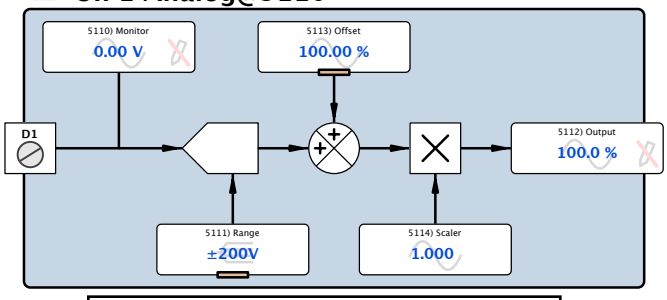
smarty + option 03
UIP1 Logic@5107



UIP Logic Block

Range Parameter	Logic Range
0	5V Logic
1	12V Logic
2	24V Logic

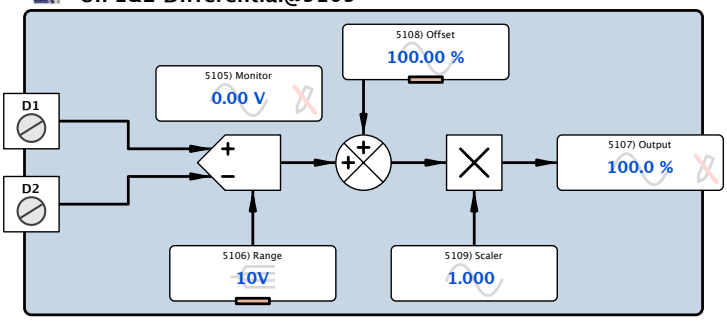
smarty + option 03
UIP1 Analog@5110



UIP Analog Block

Range Parameter	Analog Range
0	± 100 mV
1	± 5 V
2	± 10 V
3	± 100 V
4	± 200 V

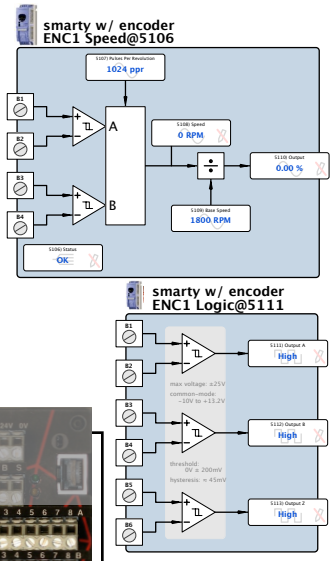
smarty + option 03
UIP1&2 Differential@5105



UIP Differential Block

Range Parameter	Input Ranges
0	100 mV
1	5 V
2	10 V

smarty Option 07 and 08, Encoder Inputs



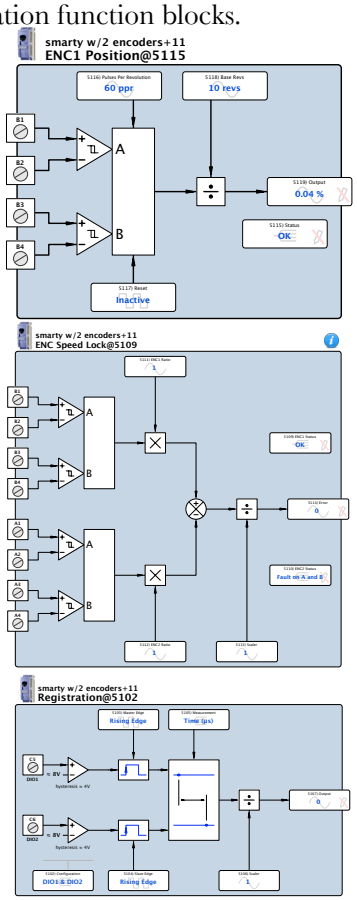
- Encoder inputs are EIA422/EIA485 receivers, **24V, 300KHz max. freq.**
- Two function block types provide bidirectional speed and logic information.
- Notice that EIA422/485 signals should be complementing differential-type. The, "+," line must swing negative with respect to the, "-," line for proper operation. A single ended 0 to 24V logic signal may NOT register correctly.
- Option 08 requires option 07.
- Speed block includes a status parameter that indicates fault conditions on A and/or B. Use this parameter to verify your EIA422 signals and connections.

Encoder Terminals:

Enc.1 Opt. 07	Enc.2 Opt. 08	Description
B1	**A1**	Encoder A+
B2	**A2**	Encoder A-
B3	**A3**	Encoder B+
B4	**A4**	Encoder B-
B5	**A5**	Encoder Marker Z+
B6	**A6**	Encoder Marker Z-
B7	**A7**	+24VDC encoder power supply, 200mA max.
B8	**A8**	0V

smarty Option 11 Encoder Control F. B. Library 4

Option 11 requires option 07 and 08 and provides position, speed-lock and registration function blocks.



Encoder Position Function Block

Set up this block for absolute position measurement:

1. Choose mechanical positions for 0 and 100%.
2. Enter number of encoder revolutions required to move from 0 to 100%
3. You may dynamically update your 0% position with a zero-position signal input connected to the, "Reset," parameter.

Encoder Speed Lock Function Block

Use this block to provide a numerical speed error signal.

Check *savvy* User Manual, Appendix A for detailed information on the following system implementations:

Create a Master speed follower system:

Condition the error signal through a PID function block and output a speed reference to a follower drive.

Create a Phase Lock system:

Condition the error signal through an integrator and PI function blocks and output to drive.

Encoder Registration Function Block

Use this block to measure time or pulse delay between markers.

Choose whether the registration markers are signals on Digital I/O inputs 1 and 2, Encoder markers Z or combinations of DIO's and Z's.

smarty Appendix A Function Blocks by Library and Option

Bold header indicates function block category. Precursor indicates # of parameters inside each block.

Basic smarty

Arithmetic
3 Adder
3 Divider
3 Multiplier
3 Subtracter
Clamps
4 Clamp
Control
15 PI
Drive Helper
11 Optidrive Helper
Logic Gates
3 AND
2 NOT
3 OR
Switches
4 2-In Switch
4 2-Out Switch
Utility
1 Dev. Comms Monitor
1 Indicator
4 Parameter Block
6 Watchdog
1 Watchdog Driver

Process Control Library Option 05

Arithmetic
3 Differential Splitter
4 Multiplier-Divider
3 Sign And Value
3 Sign Changer
Clamps
5 Clamp with Monitor
4 Deadband
4 Skipband
Comparators
4 Comparator
5 Equality Comparator
3 Maximum
3 Minimum
6 Window Comparator
Control
6 Differentiator
8 Integrator
15 PI
20 PID
8 Profiler
Counters
17 Up/Down Counter
Drive Helper
11 Optidrive Helper
Filters
4 Low Pass Filter
5 Moving Average Filter
Latches
4 D Latch
5 D Latch with Reset
5 D Latch with Set
6 D Latch w/Set, Reset
3 SR Latch
4 T Latch
Logic
17 16-Bit Binary Encod.
17 16-Bit Binary Decod.
5 4-Bit Binary Encoder
16 4-Bit Priority Encod.
3 Bitwise AND
2 Bitwise NOT
3 Bitwise OR
3 Bitwise Shift
3 Bitwise XOR
Logic Gates
3 NAND
3 NOR
3 XNOR
3 XOR
Ramps
7 Linear Ramp
11 MOP
17 S Ramp
Switches
18 16-In Switch
18 16-Out Switch
6 4-In Switch
6 4-Out Switch
10 8-In Switch
10 8-Out Switch
3 Track and Hold
Timers
5 Delay-Off Timer
5 Delay-On Timer
3 One Shot
5 Oscillator
8 Underlap
Utility
4 User Logger

Option 02, 04

Utility
4 Modbus Indirect

Option 03

I/O
2 AOP's
3 DIO's
5 UIP Differential
5 UIP Analog
3 UIP Logic

Option 06

Winder
18 Diameter Calculator
7 Taper Tension
30 Torque Compensator

Options 07,08

I/O
3 ENC Logic
5 ENC Speed

Option 10

Math
2 ArcCosine
2 ArcSine
2 ArcTangent
2 Cosine
2 Cube
2 Cube Root
2 Exponential
2 Logarithm
2 Reciprocal
2 Sine
2 Square
2 Square Root
2 Tangent

Option 11

I/O
5 ENC Position
6 ENC Speed Lock
7 Registration

Option 12

ModbusRTU Master
7 Comms Port
48EurothermERCFW09
6 Holding Reg. INT16
6 Holding Reg. UINT16
54 Optidrive Plus
54 Optidrive VTC
48 WEG CFW09

Appendix B drive.web Product Line Overview

smarty Full featured DPC that simultaneously manages many varied process components and drives.

speedy sp and **speedy485** Processing power, tailored for your drive or generic, Ethernet, EIA485

savvy **Signal Flow Diagram Option** Easily implement your systems designs. **"Drag n' Drop,"** connections with complete, graphical documentation created in one step and stored in your device.

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